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33031 7590 09/12/2008 CAMPBELL STEPHENSON LLP 11401 CENTURY OAKS TERRACE BLDG. H, SUITE 250 AUSTIN, TX 78758				
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SHAW, PELING ANDY				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/010,918

**Applicant(s)**

CHERITON, DAVID R.

**Examiner**

PELING A. SHAW

**Art Unit**

2144

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 22 July 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-7, 9-15, 17-22, 24-30, 32-38, 40-46, 48-54 and 56-58 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7, 9-15, 17-22, 24-30, 32-38, 40-46, 48-54 and 56-58 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 December 2007 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-846)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

1. Amendment received on 07/22/2008 has been entered into record. Claims 18 and 58 are amended. Claims 1-7, 9-15, 17-22, 24-30, 32-38, 40-46, 48-54 and 56-58 are currently pending.
2. Applicant's submission filed on 10/30/2007 was entered. Claims 1, 9, 17, 24, 32, 40 and 48 were amended. Claims 8, 16, 23, 31, 39, 47 and 55 were cancelled.
3. Amendment received on 04/16/2007 was entered into record. Claims 1, 9, 12, 17, 24, 32, 35, 40 and 48 were amended.
4. Applicant's submission filed on 09/11/2006 was entered. Claims 1, 9, 17, 24, 32, 40 and 48 were amended.
5. Amendment received on 02/27/2006 was entered into record. Claims 9, 12, 17, 32, 35, 48 and 51 were amended. Claims 56-58 were new.

***Priority***

6. This application has no priority claim made. The filing date is 12/07/2001.

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-7, 9-15, 17-22, 24-30, 32-38, 40-46, 48-54 and 56-58 are rejected under 35

U.S.C. 103(a) as being unpatentable over Uga et al. (US 6718326 B2), hereinafter referred as

Uga and in view of Venkatachary et al. (US 20020089937 A1), hereinafter referred as Venkatachary.

- a. Uga shows (claim 1) a method of processing a packet comprising: populating a said plurality of multi-feature packet processing rules in a multi-feature classification memory (Fig. 3 and 20, column 2, lines 33-52: packet classification rule table; column 20, lines 37-43: packet classification search through a table of plurality rules); and populating an associated content-addressable memory with a plurality of indices, wherein said indices are indices of said plurality of multi-feature packet processing rules in said multi-feature classification memory (Fig. 4, column 10, lines 52-61: search information flags and search related information search tags grouped, inputted to said content addressable memory and comparison related information showing rules for next searching), and said content-addressable memory and said multi-feature classification memory are associated with one another by virtue of said content-addressable memory being coupled to provide an index of said indices to said multi-feature classification memory, and each of said indices corresponds to at least one of said multi-feature packet processing rules (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions). Uga does not explicitly show (claim 1) creating a plurality of multi-feature packet processing rules, wherein said creating comprises, for each multi-feature packet processing rule of said multi-feature packet processing rules, forming said each multi-feature packet

- processing rule by merging a plurality of features from a feature hierarchy, each of said features is defined in said feature hierarchy, and at least one of said features in said feature hierarchy comprise another of said features in said feature hierarchy. However, Uga does show (claim 1) the rules to which the grouped fields are related (column 4, lines 54-65); combine and store grouped fields included in the rules into a plurality of groups (column 5, line 27-49).
- b. Venkatachary shows (claim 1) creating a plurality of multi-feature packet processing rules, wherein said creating comprises, for each multi-feature packet processing rule of said multi-feature packet processing rules, forming said each multi-feature packet processing rule by merging a plurality of features from a feature hierarchy, each of said features is defined in said feature hierarchy, and at least one of said features in said feature hierarchy comprise another of said features in said feature hierarchy (paragraph 7: Necessary Path Condition Rules (NPCR) and sub-databases are extracted from a Hierarchical Subdivision Tree; paragraph 14: compares the packet header to a set of NPCR, the result of the comparison defines a subset of classification rules to be searched in order to find a best matching rule; paragraph 43: NPCR can be reduced, along with the number of sub-rule databases via a rule merging technique called Rule Subset Hoisting, creating a new sub-database) in an analogous art for the purpose of packet matching.
- c. It would have been obvious to a person of ordinary skill in the art at the time of the invention was made to modify Uga's function's (column 4, lines 54-65) packet classification search using a rule table, search information flags and search related

- information search tags with Venkatachary's functions of (paragraphs 6-7) packet matching system using Content Addressable Memory storing and selecting NPCR built upon hierarchical subdivision tree.
- d. The modification would have been obvious because one of ordinary skill in the art would have been motivated to combine Venkatachary's merging NPCR rules built upon hierarchical subdivision tree in the art of packet processing based grouped rules for further action as per Uga (column 4, lines 54-65 and column 5, line 27-49) and Venkatachary (paragraph 7).
- e. Regarding claim 2, Uga shows further comprising: identifying a classification of said packet (column 20, line 37-43: classify the flow of said packed); and using said classification to identify said multi-feature packet processing rule (column 20, line 37-43: actions to be performed).
- f. Regarding claim 3, Uga shows wherein said classification is based on a plurality of parameters of said packet (column 20, line 37-43: based upon fields included in packet).
- g. Regarding claim 4, Uga shows further comprising: receiving said packet (column 20, lines 61-63: packed inputted); finding a match for said classification in said associated content-addressable memory (column 20, line 64-column 21, line 12: search until actions obtained in content addressable memory); and receiving one of said indices from said associated content-addressable memory for one of said multi-feature packet processing rules in said multi-feature classification memory (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet

- classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions).
- h. Regarding claim 5, Uga shows further comprising: using said index to receive said multi-feature packet processing rule from said multi-feature classification memory (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions).
- i. Regarding claim 6, Uga shows further wherein said content-addressable memory is a multi-feature content addressable memory (column 4, lines 54-65: the rules to which the grouped fields are related; column 5, line 27-49: combine and store grouped fields included in the rules into a plurality of groups).
- j. Regarding claim 7, Uga shows wherein said content-addressable memory is a feature based content-addressable memory bank (column 4, lines 15-32: CAM memory bank; column 20, line 44-50: groups of fields and rules related the grouped fields).
- k. Regarding claim 56, Uga shows further comprising: retrieving a one of said plurality of indices stored in an entry of said associated content-addressable memory by accessing said entry of said associated content-addressable memory, wherein said one of said plurality of indices is stored in said entry of said associated content-addressable memory (column 12, lines 45-50: receives result from the match of input data with the content addressable memory); and accessing a one of said plurality of

multi-feature packet processing rules in said multi-feature classification memory using said one of said plurality of indices, wherein said one of said plurality of indices corresponds to said one of said plurality of multi-feature packet processing rules (column 12, line 51-column 13, line 2: read in actions, next Flag and association Tag).

1. Regarding claim 9, Uga shows a method of processing a packet comprising: identifying a classification of said packet in a content-addressable memory (column 20, line 37-43: classify the flow of said packet); causing said content-addressable memory to provide an index of a plurality of indices to a multi-feature classification memory, wherein said index corresponds to said classification (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions); locating a multi-feature packet processing rule in a multi-feature classification memory (column 20, line 37-43: actions to be performed), said locating uses said index, and said content-addressable memory and said multi-feature classification memory are coupled to one another by virtue of said content-addressable memory being coupled to provide said index to said multi-feature classification memory (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions). Venkatachary shows said



- multi-feature packet processing rule is created by forming said multi-feature packet processing rule by merging a plurality of features from a feature hierarchy, each of said features is defined in said feature hierarchy, at least one of said features in said feature hierarchy comprise another of said features in said feature hierarchy (paragraph 7: Necessary Path Condition Rules (NPCR) and sub-databases are extracted from a Hierarchical Subdivision Tree; paragraph 14: compares the packet header to a set of NPCR, the result of the comparison defines a subset of classification rules to be searched in order to find a best matching rule; paragraph 43: NPCR can be reduced, along with the number of sub-rule databases via a rule merging technique called Rule Subset Hoisting, creating a new sub-database).
- m. Regarding claim 10, Uga shows further comprising: processing said packet according to said multi-feature packet processing rule (column 20, line 37-43: actions to be performed).
- n. Regarding claim 11, Uga shows wherein said classification is based on a plurality of parameters of said packet (column 20, line 37-43: based upon fields included in packet).
- o. Regarding claim 12, Uga shows further comprising: receiving said packet (column 20, line s61-63: packed inputted); finding a match for said classification in a said content-addressable memory (column 20, line 64-column 21, line 12: search until actions obtained in content addressable memory); and receiving an said index from said content-addressable memory for said multi-feature packet processing rule in said multi-feature classification memory (Fig. 4 and 23; column 12, line 28-column 13,

- line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions).
- p. Regarding claim 13, Uga shows further comprising: using said index to receive said multi-feature packet processing rule from said multi-feature classification memory (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions).
- q. Regarding claim 14, Uga shows further wherein said content-addressable memory is a multi-feature content addressable memory (column 4, lines 54-65: the rules to which the grouped fields are related; column 5, line 27-49: combine and store grouped fields included in the rules into a plurality of groups).
- r. Regarding claim 15, Uga shows wherein said content-addressable memory is a feature based content-addressable memory bank (column 4, lines 15-32: CAM memory bank; column 20, line 44-50: groups of fields and rules related the grouped fields).
- s. Regarding claim 57, Uga shows wherein said identifying generates an index (column 12, line 51-column 13, line 2: read in actions, next Flag and association Tag), and said locating uses said index to locate said multi-feature packet processing rule (column 12, line 51-column 13, line 2: compare association Tag; column 11, lines 8-12: association Tag has the same values as the rule numbers).

- t. Regarding claim 17, Uga shows a packet processing rule lookup system for processing a packet comprising: a multi-feature classification memory wherein said multi-feature classification memory is configured to store a plurality of multi-feature packet processing rules (Fig. 3 and 20, column 2, lines 33-52: packet classification rule table; column 20, lines 37-43: packet classification search through a table of plurality rules), said each of said multi-feature packet processing rules is configured to allows said packet to be processed with regard to a set of said features corresponding to said each of said multi-feature packet processing rules (column 20, line 37-43: actions to be performed); and a content-addressable memory coupled to said multi-feature classification memory, wherein said content-addressable memory is configured to store a plurality of indices, and each of said indices corresponds to at least one of said plurality of packet processing rules for a plurality of features (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions). Venkatachary shows each of said multi-feature packet processing rules comprises a merged set of features, said merged set of features comprise a plurality of features from a feature hierarchy, each of said features is defined in said feature hierarchy, at least one of said features in said feature hierarchy comprise another of said features in said feature hierarchy (paragraph 7: Necessary Path Condition Rules (NPCR) and sub-databases are extracted from a Hierarchical Subdivision Tree; paragraph 14: compares the packet header to a set of NPCR, the

- result of the comparison defines a subset of classification rules to be searched in order to find a best matching rule; paragraph 43: NPCR can be reduced, along with the number of sub-rule databases via a rule merging technique called Rule Subset Hoisting, creating a new sub-database).
- u. Regarding claim 18, Uga shows a network element comprising the packet processing rule lookup system of claim 17 (column 20, lines 37-43: a packet classification search device).
  - v. Regarding claim 19, Uga shows further comprising: a processor coupled to said multi-feature classification memory (column 20, line 61-column 21, line 12: a processing device), said processor is configured to process a plurality of packets according to said plurality of packet processing rules ((column 20, line 37-43: actions to be performed).
  - w. Regarding claim 20, Uga shows further comprising: a network interface coupled to said processor (Fig. 1, item 300s), said network interface is configured to provide input output interface for said network element (column 20, line 61-column 21, line 12: packets inputted; Fig. 1, output to switch); and a memory coupled to said processor, said memory is configured to store information (Fig. 2, content addressable memory).
  - x. Regarding claim 21, Uga shows wherein said content-addressable memory is a multi-feature content addressable memory (column 4, lines 54-65: the rules to which the grouped fields are related; column 5, line 27-49: combine and store grouped fields included in the rules into a plurality of groups).

- y. Regarding claim 22, Uga shows wherein said content-addressable memory is a feature based content-addressable memory bank (column 4, lines 15-32: CAM memory bank; column 20, line 44-50: groups of fields and rules related the grouped fields).
- z. Regarding claim 58, Uga shows wherein said content-addressable memory is configured to provide a one of said plurality of indices to said multi-feature classification memory (column 11, lines 8-12: association Tag has the same values as the rule numbers), in response to an entry of said associated content-addressable memory being accessed, wherein said one of said plurality of indices is stored in said entry of said associated content-addressable memory (column 10, lines 52-61: Search Tag corresponds to association Tag), and said multi-feature classification memory is configured to produce a one of said plurality of packet processing rules for said plurality of features, in response to receiving said one of said plurality of indices, wherein said one of said plurality of packet processing rules for said plurality of features corresponds to said one of said plurality of indices (column 20, line 61-column 21, line 12: either for action or continue for search).
- aa. Regarding claim 24, Uga shows a network element (column 20, lines 37-43: a packet classification search device) comprising: means for populating said plurality of multi-feature packet processing rules in a multi-feature classification memory (Fig. 3 and 20, column 2, lines 33-52: packet classification rule table; column 20, lines 37-43: packet classification search through a table of plurality rules); and means for populating an associated content-addressable memory with a plurality of indices,

wherein said indices of said plurality of multi-feature packet processing rules in said multi-feature classification memory (Fig. 4, column 10, lines 52-61: search information flags and search related information search tags grouped, inputted to said content addressable memory and comparison related information showing rules for next searching), said content-addressable memory and said multi-feature classification memory are associated with one another by virtue of said content-addressable memory being coupled to provide an index of said indices to said multi-feature classification memory, and each of said indices corresponds to at least one of said multi-feature packet processing rules (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions). Venkatachary shows means for creating a plurality of multi-feature packet processing rules, wherein said means for creating comprises, for each multi-feature packet processing rule of said multi-feature packet processing rules, means for forming said each multi-feature packet processing rule by merging a plurality of features from a feature hierarchy, each of said features is defined in said feature hierarchy, and at least one of said features in said feature hierarchy comprise another of said features in said feature hierarchy (paragraph 7: Necessary Path Condition Rules (NPCR) and sub-databases are extracted from a Hierarchical Subdivision Tree; paragraph 14: compares the packet header to a set of NPCR, the result of the comparison defines a subset of classification rules to be searched in order to find a best matching rule; paragraph 43:

- NPCR can be reduced, along with the number of sub-rule databases via a rule merging technique called Rule Subset Hoisting, creating a new sub-database).
- bb. Regarding claim 25, Uga *shows* further comprising: means for identifying a classification of said packet (column 20, line 37-43: classify the flow of said packed); and means for using said classification to identify said multi-feature packet processing rule (column 20, line 37-43: actions to be performed).
- cc. Regarding claim 26, Uga *shows* wherein said classification is based on a plurality of parameters of said packet (column 20, line 37-43: based upon fields included in packet).
- dd. Regarding claim 27, Uga *shows* further comprising: means for receiving said packet (column 20, lines 61-63: packed inputted); means for finding a match for said classification in said associated content-addressable memory (column 20, line 64-column 21, line 12: search until actions obtained in content addressable memory); and means for receiving one of said indices from said associated content-addressable memory for one of said multi-feature packet processing rules in said multi-feature classification memory (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions).
- ee. Regarding claim 28, Uga *shows* further comprising: means for using said index to receive said multi-feature packet processing rule from said multi-feature classification memory (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-

- 60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions).
- ff. Regarding claim 29, Uga shows wherein said content-addressable memory is a multi-feature content addressable memory (column 4, lines 54-65: the rules to which the grouped fields are related; column 5, line 27-49: combine and store grouped fields included in the rules into a plurality of groups).
- gg. Regarding claim 30, Uga shows wherein said content-addressable memory is a feature based content-addressable memory bank (column 4, lines 15-32: CAM memory bank; column 20, line 44-50: groups of fields and rules related the grouped fields).
- hh. Regarding claim 32, Uga shows a network element (column 20, lines 37-43: a packet classification search device) comprising: a content-addressable memory (Fig. 2, item 621); means for identifying a classification of said packet in said content-addressable memory (column 20, line 37-43: classify the flow of said packed); means for causing said content-addressable memory to provide an index of a plurality of indices to a multi-feature classification memory, wherein said index corresponds to said classification ((Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions); means for locating a multi-feature packet processing rule in a multi-feature classification memory (column 20, line 37-43:



- actions to be performed); and said means for locating is configured to use said index, and said content-addressable memory and said multi-feature classification memory are coupled to one another by virtue of said content-addressable memory being coupled to provide said index to said multi-feature classification memory (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions). Venkatachary shows said means for locating comprises a means for forming said multi-feature packet processing rule, said means for forming comprises means for merging a plurality of features from a feature hierarchy, each of said features is defined in said feature hierarchy, at least one of said features in said feature hierarchy comprise another of said features in said feature hierarchy (paragraph 7: Necessary Path Condition Rules (NPCR) and sub-databases are extracted from a Hierarchical Subdivision Tree; paragraph 14: compares the packet header to a set of NPCR, the result of the comparison defines a subset of classification rules to be searched in order to find a best matching rule; paragraph 43: NPCR can be reduced, along with the number of sub-rule databases via a rule merging technique called Rule Subset Hoisting, creating a new sub-database).
- ii. Regarding claim 33, Uga shows further comprising: means for processing said packet according to said multi-feature packet processing rule (column 20, line 37-43: actions to be performed).

- jj. Regarding claim 34, Uga shows wherein said classification is based on a plurality of parameters of said packet (column 20, line 37-43: based upon fields included in packet).
- kk. Regarding claim 35, Uga shows further comprising: means for receiving said packet (column 20, line s61-63: packed inputted); means for finding a match for said classification in said content-addressable memory (column 20, line 64-column 21, line 12: search until actions obtained in content addressable memory); and means for receiving said index from said content-addressable memory for said multi-feature packet processing rule in said multi-feature classification memory (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions).
- ll. Regarding claim 36, Uga shows further comprising: means for using said index to receive said multi-feature packet processing rule from said multi-feature classification memory (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions).
- mm. Regarding claim 37, Uga shows wherein said content-addressable memory is a multi-feature content addressable memory (column 4, lines 54-65: the rules to which

- the grouped fields are related; column 5, line 27-49: combine and store grouped fields included in the rules into a plurality of groups).
- nn. Regarding claim 38, Uga shows wherein said content-addressable memory is a feature based content-addressable memory bank (column 4, lines 15-32: CAM memory bank; column 20, line 44-50: groups of fields and rules related the grouped fields).
- oo. Regarding claim 40, Uga shows populate a plurality of multi-feature packet processing rules in a multi-feature classification memory (Fig. 3 and 20, column 2, lines 33-52: packet classification rule table; column 20, lines 37-43: packet classification search through a table of plurality rules), and populate an associated content-addressable memory with a plurality of indices, wherein said indices are indices of said plurality of multi-feature packet processing rules in said multi-feature classification memory (Fig. 4, column 10, lines 52-61: search information flags and search related information search tags grouped, inputted to said content addressable memory and comparison related information showing rules for next searching), said content-addressable memory and said multi-feature classification memory are associated with one another by virtue of said content-addressable memory being coupled to provide an index of said indices to said multi-feature classification memory, and each of said indices corresponds to at least one of said multi-feature packet processing rules (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related

information for showing rules for next search or actions). Venkatachary shows a computer program product (paragraph 6: matching engine) comprising: a set of instructions executable on a computer system, wherein said computer product is configured to process a packet by virtue of said computer product comprising said set of instructions (paragraph 6: packet matching system), and said set of instructions is configured to create a plurality of multi-feature packet processing rules, wherein said set of instructions configured to create comprises a subset of instructions configured to, for each multi-feature packet processing rule of said multi-feature packet processing rules, form said each multi-feature packet processing rule by merging a plurality of features from a feature hierarchy, each of said features is defined in said feature hierarchy, and at least one of said features in said feature hierarchy comprise another of said features in said feature hierarchy (paragraph 7: Necessary Path Condition Rules (NPCR) and sub-databases are extracted from a Hierarchical Subdivision Tree; paragraph 14: compares the packet header to a set of NPCR, the result of the comparison defines a subset of classification rules to be searched in order to find a best matching rule; paragraph 43: NPCR can be reduced, along with the number of sub-rule databases via a rule merging technique called Rule Subset Hoisting, creating a new sub-database); computer readable storage media, wherein said computer program product is encoded in said computer readable storage media (paragraph 6: matching engine).

pp. Regarding claim 41, Uga shows wherein said set of instructions is further configured to: identify a classification of said packet (column 20, line 37-43: classify the flow of

- said packed); and use said classification to identify said multi-feature packet processing rule (column 20, line 37-43: actions to be performed).
- qq. Regarding claim 42, Uga shows wherein said classification is based on a plurality of parameters of said packet (column 20, line 37-43: based upon fields included in packet).
- rr. Regarding claim 43, Uga shows wherein said set of instructions is further configured to: receive said packet (column 20, lines 61-63: packed inputted); find a match for said classification in said associated content-addressable memory (column 20, line 64-column 21, line 12: search until actions obtained in content addressable memory); and receive one of said indices from said associated content-addressable memory for one of said multi-feature packet processing rules in said multi-feature classification memory (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions).
- ss. Regarding claim 44, Uga shows wherein said set of instructions is further configured to: use said index to receive said multi-feature packet processing rule from said multi-feature classification memory (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions).

- tt. Regarding claim 45, Uga shows wherein said content-addressable memory is a multi-feature content addressable memory (column 4, lines 54-65: the rules to which the grouped fields are related; column 5, line 27-49: combine and store grouped fields included in the rules into a plurality of groups).
- uu. Regarding claim 46, Uga shows wherein said content-addressable memory is a feature based content-addressable memory bank (column 4, lines 15-32: CAM memory bank; column 20, line 44-50: groups of fields and rules related the grouped fields).
- vv. Regarding claim 48, Uga shows a computer system comprises a content addressable memory (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions); identify a classification of said packet in said content-addressable memory (column 20, line 37-43: classify the flow of said packed); causing aid content-addressable memory to provide an index of said indices to said multi-feature classification memory, wherein said index corresponds to said classification (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions), and locate a multi-feature packet processing rule in a multi-feature classification memory (column 20, line 37-43: actions to be performed); said locating users index, and said content-addressable memory and said

multi-feature classification memory are coupled to one another by virtue of said content-addressable memory being coupled to provide said index to said multi-feature classification memory (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60; packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions). Venkatachary shows a computer program product (paragraph 6: matching engine) comprising: a set of instructions executable on a computer system (paragraph 6: packet matching system), said computer program is configured to process a packet by virtue of said computer product comprising said set of instructions; said multi-feature packet processing rule is created by forming said multi-feature packet processing rule by merging a plurality of features from a feature hierarchy, each of said features is defined in said feature hierarchy, at least one of said features in said feature hierarchy comprise another of said features in said feature hierarchy (paragraph 7: Necessary Path Condition Rules (NPCR) and sub-databases are extracted from a Hierarchical Subdivision Tree; paragraph 14: compares the packet header to a set of NPCR, the result of the comparison defines a subset of classification rules to be searched in order to find a best matching rule; paragraph 43: NPCR can be reduced, along with the number of sub-rule databases via a rule merging technique called Rule Subset Hoisting, creating a new sub-database); ); computer readable storage media, wherein said computer program product is encoded in said computer readable storage media (paragraph 6: matching engine).

- ww. Regarding claim 49, Uga shows wherein said set of instructions is further configured to: processing said packet according to said multi-feature packet processing rule (column 20, line 37-43: actions to be performed).
- xx. Regarding claim 50, Uga shows wherein said classification is based on a plurality of parameters of said packet (column 20, line 37-43: based upon fields included in packet).
- yy. Regarding claim 51, Uga shows wherein said set of instructions is further configured to: receive said packet (column 20, line 561-63: packet inputted); find a match for said classification in said content-addressable memory (column 20, line 64-column 21, line 12: search until actions obtained in content addressable memory); and receive an index from said content-addressable memory for said multi-feature packet processing rule in said multi-feature classification memory (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions).
- zz. Regarding claim 52, Uga shows wherein said set of instructions is further configured to: use said index to receive said multi-feature packet processing rule from said multi-feature classification memory (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions).



aaa. Regarding claim 53, Uga shows wherein said content-addressable memory is a multi-feature content addressable memory (column 4, lines 54-65: the rules to which the grouped fields are related; column 5, line 27-49: combine and store grouped fields included in the rules into a plurality of groups).

bbb. Regarding claim 54, Uga shows wherein said content-addressable memory is a feature based content-addressable memory bank (column 4, lines 15-32: CAM memory bank; column 20, line 44-50: groups of fields and rules related the grouped fields).

Together Uga and Venkatachary disclosed all limitations of claims 1-7, 9-15, 17-22, 24-30, 32-38, 40-46, 48-54 and 56-58. Claims 1-7, 9-15, 17-22, 24-30, 32-38, 40-46, 48-54 and 56-58 are rejected under 35 U.S.C. 103(a).

***Response to Arguments***

8. Applicant's arguments filed on 07/22/2008 have been fully considered, but they are not persuasive.
- a. Applicant has amended claims 18 and 58 to address Applicant's arguments on the previous claim rejections under 35 U.S.C. 112, second graph.
  - b. Applicant's argument on objections to the drawings are reviewed and accepted.
  - c. Applicant argues (3<sup>rd</sup> paragraph of page 18 through 1<sup>st</sup> paragraph of page 25 of current argument) the limitations of "indices of said plurality of multi-feature packet processing rules in said multi-feature classification memory" and "forming said each multi-feature packet processing rule by merging a plurality of features from a feature hierarchy". Examiner has reviewed the claimed invention in light of applicant's original specification and claim set. Applicant has stated in line 27 of page 5 through line 4 of page 6 in applicant's specification "Method of programming a CAM with multi-feature entries are known in the art" and in line 27 of page 7 through line 4 of page 8 in applicant's specification "Method of defining a packet pattern and looking up the packet pattern in a CAM are known in the art". Applicant has further described the merging of feature in line 26 of page 5 through line 10 of page 7 in applicant's specification. Uga talks about the rules to which the grouped fields are related (column 4, lines 54-65); and combining and storing grouped fields included in the rules into a plurality of groups (column 5, line 27-49). Uga has shown couple CAM and MFCM via association tags (column 10, lines 52-62). Uga has shown in abstract that the fields of rules of packet classification are grouped into groups, and the

- grouped fields of each rule are stored along with search related information and number of searches information in a CAM. As applicant described multi-feature classification function is mapped as Uga's packet classification corresponding to said grouped fields, number of searches information and search related information (inputted to said content addressable memory), it is clear Uga does have applicant argued limitations.
- d. Examiner further notices that feature hierarch seems to be equivalent to packet priority as per lines 2-25 of page 4 in applicant's specification. Uga has shown (column 2, lines 5-32) that the router classifies the packets in detail by packet classification, and may implement value added services by forwarding packets while allocating priority to them according to contract, or may implement discarding of packets from malicious users and it is possible to implement QoS control by performing priority control of the packets based upon the source addresses of their users and their TCP/UDP port numbers, in order to enhance the QoS of packet transmission of specified applications from specified users. Uga has shown in column 2, lines 5-32 rules or policies are defined according to contract, preventing malicious user and various fields to implement QoS for priority transmission of packets. Uga has shown in column 20, lines 1-35 that rules may overlap and overlapping procedures are defined to deny or accept packets with different priority. As per Fig. 4 and one skill in the art of routing table set up, it seems that one CAM and one search result storage device, i.e. applicant's multi-feature classification memory, seem to be enough for handle multi-feature, e.g. various routing or routing feature/rule/policy,

implementation. Uga and Venkatachary seem to have read substantially on applicant's claimed invention.

- e. It is the Examiner's position that Applicant has not submitted claims drawn to limitations, which define the operation and apparatus of Applicant's disclosed invention in manner, which distinguishes over the prior art. As it is Applicant's right to claim as broadly as possible their invention, it is also the Examiner's right to interpret the claim language as broadly as possible. It is the Examiner's position that the detailed functionality that allows for Applicant's invention to overcome the prior art used in the rejection, fails to differentiate in detail how these features are unique (see items a through d in section 7). Uga and Venkatachary have shown using content addressable to direct search result to a search result storage device/memory for packet classification search. Similar arts are identified in Reference Cited and Other Publications sections of Uga as well as those listed in the following Remark section. It is clear that Applicant must be able to submit claim language to distinguish over the prior arts used in the above rejection sections that discloses distinctive features of Applicant's claimed invention. It is suggested that Applicant compare the original specification and claim language with the cited prior art used in the rejection section above or the Remark section below to draw an amended claim set to further the prosecution.
- f. Failure for Applicant to narrow the definition/scope of the claims and supply arguments commensurate in scope with the claims implies the Applicant's intent to broaden claimed invention. Examiner interprets the claim language in a scope

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parallel to the Applicant in the response. Examiner reiterates the need for the

Applicant to more clearly and distinctly define the claimed invention.

***Remarks***

9. The following pertaining arts are discovered and not used in this office action. Office reserves the right to use these arts in later actions.

- a. Mate et al. (US 20030056001 A1) Selective routing of data flows using a TCAM
- b. Woo (US 20020023089 A1) Modular packet classification
- c. Fowler et al. (US 6504819 B2) Classes of service in an MPOA network
- d. Ginossar (US 6477143 B1) Method and apparatus for packet network congestion avoidance and control
- e. Gai et al. (US 6167445 A) Method and apparatus for defining and implementing high-level quality of service policies in computer networks
- f. Herbert (US 5325445 A) Feature classification using supervised statistical pattern recognition
- g. Schultz et al. (1994 IEEE) CAM-Based Single-Chip Shared Buffer ATM Switch
- h. Joffe et al. (US 6415354 B1) Pipelined methods and apparatus for weight selection and content addressable memory searches
- i. Abdat (US 6484170 B2) Generating searchable data entries and applications therefore
- j. Gupta et al. (ACM SIGCOMM '99, September 1999, Harvard University) Packet Classification on Multiple Fields

***Conclusion***

10. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Refer to the enclosed PTO-892 for details.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Peling A. Shaw whose telephone number is (571) 272-7968. The examiner can normally be reached on M-F 8:00 - 4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William C. Vaughn can be reached on (571) 272-3922. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

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applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/P. A. S./

Examiner, Art Unit 2144

/William C. Vaughn, Jr./

Supervisory Patent Examiner, Art Unit 2144



**Application Number****Application/Control No.**

10/010,918

**Examiner**

PELING A. SHAW

**Applicant(s)/Patent under  
Reexamination**

CHERITON, DAVID R.

**Art Unit**

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